Application Note

Astra Machina SL2600 Series Power Consumption for Typical Use Case Configurations

Abstract: This document summarizes power consumption across typical use case configurations for the Astra Machina Evaluation System, with SL2600 Series.

Contents

1. Introduction

The Synaptics® Astra™ Machina SL2600 Series of embedded processors are highly integrated AI-Native Linux® and Android™ SoCs optimized for consumer, enterprise and industrial IoT workloads with hardware accelerators for multimodal edge inferencing, security, video, graphics, and audio.

The SL2610 product line offers comprehensive power efficiency features including an ultra-low-power subsystem, fine-grained on-demand control of power domains, multi-level power states, and dynamic voltage and frequency switching

1.1. Typical Power Consumption: SL26xx

In practical applications, when Dynamic Voltage Frequency Scaling (DVFS) is implemented, the software works alongside the hardware to automatically adjust voltage and frequency values according to the specific use case requirements. Therefore, the overall system power consumption depends on both software optimization and how the system hardware is implemented.

1.1. Power Measurement Conditions

- SoC CPU @ 1.7 GHz for all of the testing cases.
  - Nominal voltage
  - WFI: Wake For Interrupt
  - GE: Gigabit Ethernet
  - SM: System Manager
- DRAM Configuration
  - SL2610: x16 4GB DDR memory (2pcs x8 16Gbit DDR4), 3200 Mbps
- System Manager CPU at 200 MHz
- Temperature: Typical part at Tj = 30°C
- Wakeup Mode:
  - System Manager wake-up mode (AON): AON-GPIO

1.1.1. SL2610 Series Power Consumption Measurement Conditions & Results

Table 1. SL2610 Power Consumption Measurement Conditions

Item	Power Mode	SM	CORE	CPU	Video Display /GPU (on for display)	NPU	Audio DSP / Codec	DDR	Wakeup Modes
14	Active - CPU-A (CPU1- memcpy, CPU2 idle) + CAMERA (CSI:1280x720)	On	On	CPU1 busy, CPU2 idle + CAMERA	No/No	No	No	Normal	—
13	Active - CPU-A (CPU1- memcpy, CPU2 idle) + DISPLAY	On	On	CPU1 busy, CPU2 idle + DISPLAY	No/No	No	No	Normal	—
12	Active - CPU-A (CPU1- memcpy (32-bit), CPU2 idle)	On	On	CPU1 busy, CPU2 idle	No/No	No	No	Normal	—
11	Active - CPU-B (CPU1 -memcpy, CPU2-vdec)	On	On	CPU1 busy, CPU2-busy	No/No	No	No	Normal	—
10	Active - GPU	On	On	CPU1/2 on + GPU	No/Yes	No	No	Normal	—
9	Active - NPU	On	On	CPU1/2 on + NPU (image classification)	No/Yes	Yes	No	Normal	—
8	Active - Idle (CPU1 idle, CPU2 idle)	On	On	CPU1 idle, CPU2-idle	No/No	No	No	Normal	—
7	Active - Lite (CPU1 idle, CPU2-Power Down)	On	On	CPU1 idle, CPU2-Power Down	No/No	No	No	Normal	—
6	MCU -Active (MCU-Coremark)	On	Off	MCU-200MHz; CPU1/2 Power down	No/No	No	No	Off	—
5	MCU - Active, Low Power Display	On	On (clock gating)	MCU 100 MHz; DSI running, CPU1/2 + NPU + GPU Power down, display connected (panel consumption not included)	No/No	No	No	Self-Refresh LPDDR4-estimated	—
4	Suspend-to-Memory: MCU-only (MCU-Idle, 200 MHz) + DDR4 Self-refresh	On	Off	MCU-Idle; CPU1/2 Power down, DDR4 self-refresh (2x16Gbit)	No/No	No	No	Self-Refresh	—
3	Suspend-to-Memory: (MCU-Idle, 200 MHz) + DDR3 Self-refresh	On	Off	MCU-Idle; CPU1/2 Power down, DDR3 self-refresh (512MB)	No/No	No	No	Self-Refresh	—
2	MCU-Deep Sleep	Retention	Off	MCU Deep Sleep Mode (logic and memory in Retention mode)	No/No	No	No	Off	AON-GPI
1	Standby	Off	Off	MCU Standby; CPU1/2 off	No/No	No	No	Off	AON-GPI

Table 2. SL2610 Power Consumption Measurement Results

Item	Power Mode	SM	Core	DDR/LPDDR PHY	DDR/LPDDR Device	DDR-VDDM: 2.5V DDR4 only	1.8V	3.3V	SOC_TOTAL
		Power (Avg): Typ part at Tj = 30 degC (mW)							
14	Active - CPU-A (CPU1- memcpy, CPU2 idle) + CAMERA (CSI:1280x720)	26.8	349	102.2	239.8	20	17.112	1.3	496.412
13	Active - CPU-A (CPU1- memcpy, CPU2 idle) + DISPLAY	26.8	356	104.2	239.8	20	24.112	1.3	512.412
12	Active - CPU-A (CPU1- memcpy (32-bit), CPU2 idle)	26.8	458.9	161.28	376.32	20.7	13.112	1.3	661.392
11	Active - CPU-B (CPU1 -memcpy, CPU2-vdec)	26.2	387	96.3	224.7	20	12.878	1.3	523.678
10	Active - GPU	26.8	466	107.4	251.6	20	12.878	1.3	614.378
9	Active - NPU	26.8	425	110.4	256.6	20	12.878	1.3	576.378
8	Active - Idle (CPU1 idle, CPU2 idle)	26.2	310	86.4	201.6	20	12.878	1.3	436.778
7	Active - Lite (CPU1 idle, CPU2-Power Down)	25.1	218	86.4	201.6	20	12.878	1.3	343.678
6	MCU -Active (MCU-Coremark)	27	—	—	—	—	12.878	1.3	41.178
5	MCU - Active, Low Power Display (Haier panel, 4-lane, 500Mbps)	12	35	0.4	2.3	0	15	1.4	63.8
4	Suspend-to-Memory: MCU-only (MCU-Idle, 200 MHz) + DDR4 Self-refresh	25	—	0.4	17.5	10	5	—	30
3	Suspend-to-Memory: (MCU-Idle, 200 MHz) + DDR3 Self-refresh	25	—	0.4	13	—	5	—	30
2	MCU-Deep Sleep	0.096	—	—	—	—	0.9	—	0.996
1	Standby	0.0194	—	—	—	—	0.9	—	0.9194

2. References

- *SL2610 Product Line of Embedded Processors Datasheet* (PN: 505-001501-01)
- *SL2610 Product Line Technical Reference Manual* (PN: 511-001449-01)
- *Astra Machina SL2600 Series Developer Kit User Guide* (PN: 511-001453-01)

3. Revision History

Revision	Description
A	Initial release.

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PN: 506-001658-01 Rev A